Ochlodes venata Brem & Grey (*sylvanus* Esp.)	One only.
Pontia daplidice L.	Scarce.
Pieris mannii Mayer (*manni* Stdgr.)	Very few.
Colias australis Vty. (*calida* Vty., *alfracariensis* Ribbé)	One seen.
Gonepteryx rhamni L.	Scarce.
Pandoriana pandora Schiff. (*maja* Cramer)	Several in hotel gaqrdens.
Polygonia egea Cramer	A few outskirts of Taormina.
Polygonia c-album L.	Two on walls at Taormina.
Aglais urticae L.	Three at summit of M. Etna.
Brintesia circe F.	Two seen.
Pyronia cecilia Vallentin (*ida* Esp.)	Very worn males common.
Coenonympha pamphilus L.	Several.

The Effect of Wind Direction on the Index of Diversity of Night Flying Lepidoptera in a Particular Area

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It has been noted (Robinson, 1967) that there may be certain limitations to the general inference that from a reasonably large sample catch of insects it is possible to predict the statistical content of catches of different sizes taken at the same place within short periods of time. This prediction is based on Williams' (1943) suggestion that a random catch of insects falls into a logarithmic series whose form is a function of the index of the diversity of the area in which the catch is taken. The same author has more fully discussed the use of the logarithmic series, as applied to insect and other animal data, in a later work (Williams, 1964).

It was tentatively put forward by Robinson (1967) that occasional abnormal meteorological conditions might increase the activity of insects and extend their "normal range" of distribution. These conditions could lead to the temporary recruitment of insects to a homogenous area (with its particular index of diversity) from another homogenous area, thus creating a new, although temporary, index of diversity in the area where catches are being made.

Such an effect, even in relation to "normal" meteorological conditions of wind direction, was noted by the present author when trapping night flying lepidoptera at Carlisle from 17th July to 20th September, 1964. During this period 2,803 specimens, representing 110 species, were trapped in a Robinson-type mercury vapour lamp light trap. An analysis of the meteorological factors affecting the activity of night flying Macrolepidoptera, based on the afore-mentioned trapping period was made

(Harling, in press) and the findings were similar to those of Williams (1940). It must be emphasised here that no single meteorological factor can be completely isolated as independently influencing activity. However, a factor like the wind, which has a directional component, may influence "range of activity" in flyng insects when other meteorological factors, e.g. heavy rainfall, are not present in full force. In the above analysis it was noted that the wind direction pertaining on a trapping night did appear to influence the numbers of specimens caught during that night. When east winds (from NNE to SSE) and west winds (from NNW to SSW) were considered, catches appeared to be higher on nights with east winds than on those with west winds. If nights where the rainfall was greater than 0·1 inches, and where wind force was greater than force 3 (factors which became more influential above these values) were ignored, then the average catch per night of east wind was 62·8 (mean of 16 nights) and for nights of west wind 39·5 (mean of 15 nights). Differences in the index of diversity on particular nights were also noted to be correlated with the wind direction pertaining on those nights. A summary of the composition of catches and the wind direction pertaining when each was made can be seen in Table I.

TABLE I

Summary of catches of night-flying Lepidoptera and wind directions pertaining on respective trapping nights for the period July 17-Sept. 20, 1964.

Date	Number of specimens	Number of species	Wind direction*	Date	Number of specimens	Number of species	Wind direction*	Date	Number of specimens	Number of species	Wind direction*
17 vii	134	24	E	8 viii	29	17	E	1 ix	25	12	E
18-20 vii	no data			9 ,,	46	17	N	2 ,,	34	16	E
21 vii	150	34	E	10 ,,	33	12	—	3 ,,	102	24	E
22 ,,	145	29	E	11 ,,	43	16	N	4 ,,	67	0	—
23 ,,	93	31	W	12 ,,	128	23	E	5 ,,	50	15	—
24 ,,	85	27	W	13 ,,	63	25	E	6 ,,	20	8	W
25 ,,	71	27	W	14 ,,	116	27	E	7 ,,	32	11	W
26 ,,	85	33	W	15 ,,	89	24	E	8 ,,	26	13	W
27 ,,	79	26	W	16 ,,	65	21	E	9 ,,	4	4	W
28 ,,	18	12	W	17 ,,	78	27	E	10 ,,	11	8	W
29 ,,	112	35	E	18 ,,	67	22	E	11 ,,	13	6	W
30 ,,	59	26	W	19 ,,	23	12	N	12 ,,	12	6	E
31 ,,	63	25	W	20 ,,	7	5	W	13 ,,	3	3	E
1 viii	no data			21 ,,	4	4	W	14 ,,	37	14	E
2 ,,	59	21	W	22 ,,	16	8	W	15 ,,	4	3	E
3 ,,	23	11	W	23 ,,	33	7	W	16 ,,	2	2	W
4 ,,	64	23	W	24-29 viii	no data			17 ,,	2	2	W
5 ,,	151	35	W	30 viii	10	9	W	18 ,,	2	2	W
6 ,,	40	18	W	31 ,,	18	11	E	19 ,,	0	0	W
7 ,,	52	24	W					20 ,,	3	3	W

*Wind direction:

E=East wind (from range NNE to SSE)

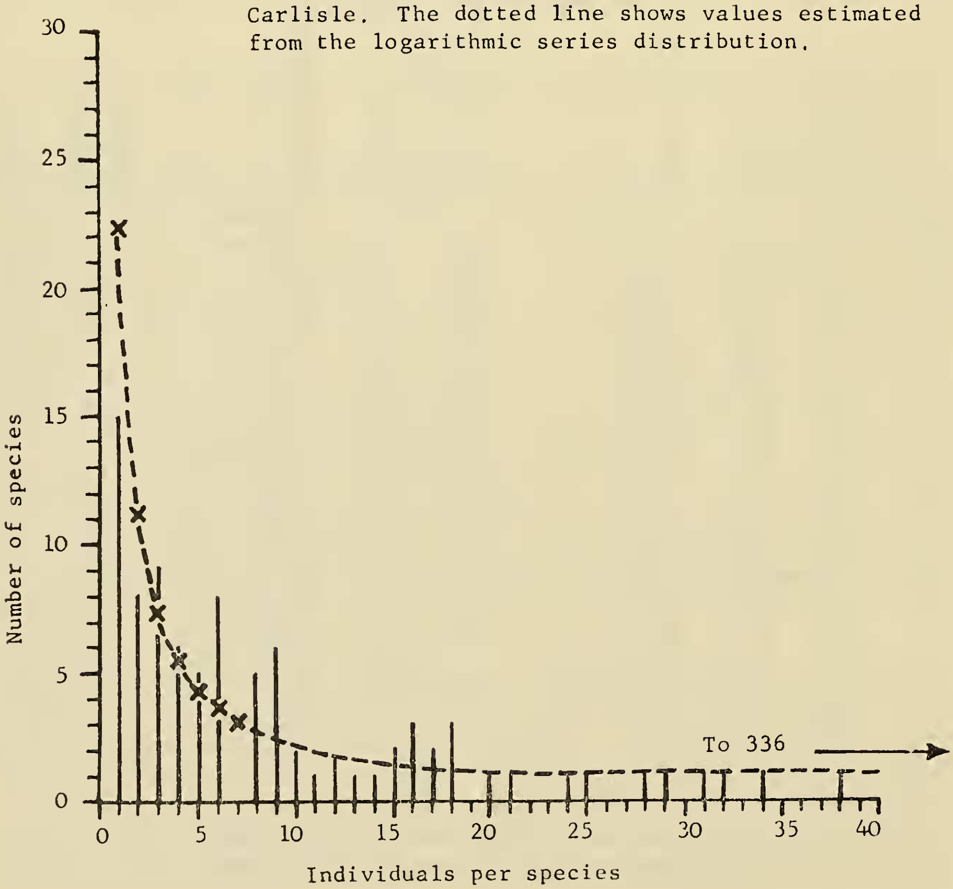
W=West wind (from range NNW to SSW)

TABLE II

The number of species of night-flying Lepidoptera with different numbers of individuals in catches taken during the trapping period July 17 to September 20, 1964

Individuals per species	No. of species observed	No. of species estimated (log. series)	Individuals per species	No. of species observed	Individuals per species	No. of species observed
1	15	22·4	19	—	54	1
2	8	11·1	20	1	56	1
3	9	7·4	21	1	57	1
4	6	5·5	22	—	66	1
5	5	4·3	23	—	68	1
6	8	3·6	24	1	70	1
7	—	3·0	25	1	71	1
8	5	2·6	26	—	74	1
9	6	2·3	27	—	83	1
10	2	2·1	28	1	91	1
11	1	1·9	29	1	92	1
12	2	1·7	31	1	94	1
13	1	1·6	32	1	107	1
14	1	1·4	34	1	119	1
15	2	—	38	1	123	1
16	3	—	41	1	138	1
17	2	—	49	1	169	1
18	3	—	50	1	336	1

Fig. 1. Frequency distribution of species of night-flying Lepidoptera, with different numbers of individuals, from catches in a mercury vapour light trap at Carlisle. The dotted line shows values estimated from the logarithmic series distribution.



If all the trapping data was analysed according to the number of species, with different numbers of individuals represented (see Table II), then the relationship between the observed frequency of distribution of species and that estimated for the logarithmic series distribution (from the index of diversity for the catches over the whole trapping period) was found to bear poor correlation. This is especially noted in the graphical comparison seen in Fig. I.

The differences between the observed distribution data and that estimated for the log. series distribution indicates that a single value for the index of diversity may not have been a constant factor throughout the trapping period. That this was so can be seen in a comparison of the trapping data from different night's catches. Several nights with reasonably large catches (over 70 specimens) are compared in Table III.

TABLE III

Comparison of the Index of Diversity for various nights during trapping period

Date	Wind direction	No. of specimens	No. of species	Index of diversity
17 July	E	134	26	10·31
21 July	E	150	34	14·84
22 July	E	145	29	10·91
12 August	E	128	23	14·46
3 Sept.	E	102	24	11·33
23 July	W	93	31	16·42
25 July	W	71	27	17·77
26 July	W	85	33	21·25
17 July-20 Sept.	—	2,803	110	22·61

It can be seen that the index of diversity was higher for nights with west winds than for those with east winds. If the wind does affect the distribution of active moths it may thus have been instrumental in causing the dispersion of moths from another area into the area where trapping was taking place, resulting in fluctuations about the calculated index of diversity of the whole trapping period.

The actual trapping took place in a suburban garden, to the east of which was a built up area extending for 3 miles, and 200 yards to the west of which was open countryside extending with liitle interruption to the Solway Firth. East winds may therefore have been responsible for contributing specimens mainly from the housing area while a more diverse species contribution from the countryside resulted from nights of west wind.

It is not suggested that wind direction is a major factor in influencing the prediction of the statistical content of catches of different sizes taken in the same place, but the above discussion may indicate that fluctuations of the type mentioned tentatively by Robinson (1967) do exist to some extent even under normal meteorological conditions.

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